

## WIRE CLOTH COFFEE FILTERING SYSTEMS

### RELATED APPLICATIONS

[0001] This application claims priority under 35 U.S.C. § 119 to U.S. Provisional Application No. 60/441,217, filed January 21, 2003; U.S. Provisional Application No. 60/468,035, filed May 6, 2003; U.S. Provisional Application No. 60/476,106, filed June 6, 2003; U.S. Provisional Application No. 60/493,572, filed August 11, 2003; and U.S. Provisional Application No. 60/441,217, filed December 21, 2003.

### TECHNICAL FIELD

[0002] The present invention relates to coffee filtering systems.

### BACKGROUND OF THE INVENTION

[0003] Current drip coffee filtering systems operate by putting dry coffee grains in a filter, and then pouring heated water the coffee grains. Typically, drip coffee filters are made of paper. The pores in the paper filter permit the brewed coffee to pass therethrough while still preventing the passage of undesirably large coffee grains. Unfortunately, paper filters suffer from many disadvantages. For example, they must be replaced after every use. Secondly, paper filters tend not to hold their shape. Therefore, coffee grains are often inadvertently spilled when the paper filters are removed. Thirdly, the paper filter's soft corner edges may inadvertently fold inwardly when placed into a coffee brewing machine such that the heated water bypasses the coffee grains partially or entirely. In addition, some of the coffee grains pour into the cup.

[0004] An additional disadvantage common to both paper filters is that they have grain leakage problems. Specifically, finer grains of coffee tend to seep through the filter and are deposited in the drinker's coffee cup. Additionally, existing paper filtering systems tend to require considerable time for coffee brewing. As a result, a

trade-off exists between the time taken to brew the coffee and the amount of unwanted coffee grains that seep through the filter into the coffee cup.

[0005] What is instead required is a system in which coffee can be brewed and filtered more quickly, so as to save time in coffee preparation. Additionally, an improved filtering system should not require constant filter replacement after every use. In addition, an improved filtering system would preferably prevent small coffee grains from passing therethrough, and being deposited in the user's coffee cup.

#### SUMMARY OF THE INVENTION

[0006] The present invention provides a beverage filter assembly having a frame with at least one (but preferably a plurality) of openings passing therethrough; and a wire cloth filter disposed within the frame.

[0007] The present invention's use of wire cloth as the filtering mechanism has many advantages. First, as compared to paper, it need not be replaced after every usage. Second, the present wire cloth filter has a pore size small enough to filter small coffee grains while still permitting flow therethrough. Advantageously, this filtering is accomplished at a rate which is faster than that of a paper filter. Third, by filtering more thoroughly and at a faster rate than paper, the filter of the present invention can be made smaller than that of a comparable paper filter. Thus, a smaller amount of coffee grains is required to brew the same amount of coffee. Fourth, the use of an optional adjustable flow restrictor can be used to selectively prolong steep times and thus also require the use of less coffee. Consequently, savings in terms of both filter costs, and coffee costs are realized.

[0008] In its various preferred embodiments, the present wire cloth filter assembly may include a diffuser disposed therein. The diffuser may simply sit in the wire cloth filter, and be removable from the wire cloth filter. Alternatively, the diffuser may be formed integral to the bottom (and/or top) of the frame. In various embodiments, the diffuser may be conical, rounded, or spherical.

[0009] The present wire cloth filter may have a density of at least 325 strands per square inch, or more preferably, at least 375 strands per square inch. Most preferably, the present wire cloth filter may have a density of at least 400 strands per square inch. The present wire cloth filter may be made of stainless steel, and may optionally be gold plated.

[0010] In various embodiments, the assembly may also include a floating member attached to the frame, and/or a lid attached to a top of the frame, and/or a flow regulator on the bottom of the frame.

[0011] Optionally, the wire cloth filter may be shaped as a flattened bag, with a plurality of rounded diffusers disposed therein. Such a flattened bag wire cloth may be disposed within a box-shaped frame.

[0012] Optionally, the frame may be a sleeve with the wire cloth filter suspended therein. In various embodiments, a rounded diffuser may sit within the wire cloth filter, and the frame may also include a top having a diffuser therein.

[0013] Optionally, the frame may be spherical, and comprise an outer frame, an inner frame with the wire cloth filter disposed therebetween.

[0014] In optional embodiments, the present wire cloth filter may be suspended by a frame held within a drinking cup, or within a coffee pot.

[0015] In further embodiments, the present invention provides a drinking straw assembly, including a drinking straw; a wire cloth filter disposed at an end of the drinking straw; and a frame having one or more openings passing therethrough disposed around the wire cloth filter.

[0016] In further embodiments, the present invention provides a beverage lid including, a lid; an air inlet passing through the lid; a fluid outlet passing through the lid; and a wire cloth filter covering the fluid outlet.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Fig. 1 is a side elevation view of a basket-type frame with a wire cloth filter therein.

[0018] Fig. 2 is a sectional side elevation view of the device of Fig. 1, showing an optional diffuser therein.

[0019] Fig. 3 is a sectional side elevation view of an alternate embodiment of a basket-type frame with a wire cloth filter therein, with the filter being spaced apart from the frame.

[0020] Fig. 4A is an exploded perspective view of a box-type frame with a flattened bag wire cloth having a plurality of rounded diffuser therein.

[0021] Fig. 4B is a sectional side elevation view through the device of Fig. 4A.

[0022] Fig. 5 is a sectional perspective view of a sleeve-type frame having a wire cloth filter disposed therein with a ball diffuser sitting in the wire cloth filter and a second diffuser formed into the top of the sleeve.

[0023] Fig. 6 is an exploded perspective view of a ball-shaped frame with a wire cloth filter disposed therein.

[0024] Fig. 7 is a drinking-straw embodiment of the present invention.

[0025] Fig. 8 is a sectional side elevation view of a beverage container with a lid incorporating the wire cloth filter of the present invention.

[0026] Fig. 9 is a perspective view of a simplified embodiment of the present invention suspended by a flotation ring.

[0027] Fig. 10 is a bottom view of an embodiment of the invention incorporating an optional flow restrictor.

[0028] Fig. 11 is an exploded perspective view of an embodiment of the invention suspended in a drinking cup.

[0029] Fig. 12 is an exploded perspective view of an embodiment of the invention suspended in a coffee pot.

#### DETAILED DESCRIPTION OF THE DRAWINGS

[0030] The present invention uses “wire cloth” for beverage filtering. In preferred uses, the present invention can be used for filtering coffee. It is to be understood, however, that the present invention is not so limited. For example, it may be used for filtering coffee or tea, or any other beverage.

[0031] As understood herein, “wire cloth” is understood to mean a weaved material having a density of at least 325 strands per square inch. In contrast, a “wire mesh” is understood to mean a weaved material having a density of less than 325 strands per square inch. Alternatively, as understood herein, “wire cloth” is understood to mean a weaved material having a micron reading of 30 or below.

[0032] In accordance with the present invention, the wire cloth may comprise a woven or perforated metal. Alternatively, the wire cloth may comprise cotton canvas, or heat-resistant plastic threaded in cloth form.

[0033] The present invention has many different embodiments. Various examples of these different embodiments of the invention are described herein. It is to be understood that the present invention is not, however, limited to any of the various exemplary embodiments described herein. Rather, other systems and designs are also contemplated, all keeping within the scope of the claimed invention.

**[0034]** Referring first to Fig. 1, a beverage filter assembly 10 is provided. Assembly 10 includes a frame 12 having a plurality of openings 13 passing therethrough. A wire cloth filter 14 is positioned within frame 12. An optional lid 15 may be connected to frame 12 by a hinge 16.

**[0035]** Wire cloth 14 may optionally be made of stainless steel. In various embodiments, wire cloth filter 14 may be gold plated. In preferred embodiments, wire cloth filter 14 has a density of at least 325 strands per square inch. More preferably, wire cloth filter 14 has a density of at least 375 strands per square inch.

**[0036]** In use, coffee grains are placed within wire cloth filter 14, and heated water is then poured thereover. The brewed coffee then seeps through wire cloth filter 14, passing out through openings 13 in frame 12. Assembly 10 can be positioned within a fluid container (into which the brewed coffee flows), or it may be positioned above a fluid container (into which the brewed coffee drips).

**[0037]** Fig. 2 shows an embodiment of the invention in which openings 13 are disposed on the bottom of frame 12. (It is to be understood that openings 13 may be disposed on the sides or bottom of frame 12, or both.) Coffee grains C are placed into the basket formed by frame 12 and wire cloth 14, as shown. When heated water is added from above, it will strike diffuser 17, splashing about at the bottom of the basket. Such splashing will cause the heated water (H<sub>2</sub>O) to mix rapidly with the coffee grains C. Such rapid mixing results in a faster preparation time for the brewed coffee, and reduces the amount of coffee needed in the filter. In contrast, existing filtering systems simply run a narrow stream of heated water through a pile of coffee grains sitting in a filter. This tends to result in dry (i.e. wasted) coffee grains around the edges of the coffee grain pile after the coffee has been brewed.

**[0038]** In preferred embodiments, diffuser 17 may be conical-shaped as shown. It may also be curved or rounded. (As will be shown in further embodiments, the diffuser may be spherical). Diffuser 17 may be integral to frame 12, as shown. (As

will be shown in further embodiments, however, a diffuser may simply sit within or on top of the wire cloth filter, and be removable from the wire cloth filter.)

**[0039]** Fig. 3 shows another optional embodiment of the invention. Assembly 20 includes a frame 22 having a plurality of openings 23. A wire cloth filter 24 is suspended within frame 22. Coffee grains C are placed in wire cloth filter 24. Heated water is then poured into the top of assembly 20 and over coffee grains C. Brewed coffee passes out through wire cloth filter 24 and out through openings 23 in frame 22. In use, assembly 20 may be partially submerged in a fluid container. IE: submerged up to water line W. (Alternatively, however, assembly 20 may instead be positioned within a flow path above a fluid container).

**[0040]** As shown, wire cloth filter 24 may be positioned such that only its top end contacts frame 22, as shown. This results in a space or gap between wire cloth filter 24 and frame 22, as shown. Designing a preferred dimension for this space gap may be particularly advantageous in adjusting the amount of time required for proper brewing. Specifically, by varying the dimensions of openings 23, the speed at which fluid passes therethrough can be adjusted, thereby adjusting the beverage preparation time. Frame 22 has a convenient handle 21 such that it can be lifted and removed from the fluid container or flow path.

**[0041]** Figs. 4A and 4B show yet another embodiment of the present invention. Assembly 30 includes a box-type frame 32 (which may have an optional lid 33). Frame 32 has a plurality of openings 31, as shown. A wire cloth 34 is formed in the shape of a flattened bag. Wire cloth bag 34 may have one end that is shut by a zipper 35. A flat plate 36 having a plurality of diffusers 38 thereon is also provided. Flat plate 36 is inserted into wire cloth bag 34. As shown in Fig. 4B, coffee grains C are also placed into wire cloth bag 34. When water is poured down onto wire cloth bag 34, it will also hit diffusers 38. The presence of diffusers 38 will cause the water to splash back and forth therebetween. This splashing will enhance mixing of the water and the coffee grains C within wire cloth bag 34. The brewed coffee will then seep out of holes 31 in frame 32.

**[0042]** Fig. 5 shows yet another embodiment of the present invention. Assembly 40 includes a frame in the shape of a sleeve 42 having a plurality of openings 43 passing therethrough. A conical-shaped wire cloth filter 44 is disposed in sleeve 42. A ball-shaped diffuser 47 is positioned to sit on top of wire cloth filter 44. Sleeve 42 has a top 45 having a grill-type diffuser 46 therein. A bottom 48 is also provided.

**[0043]** In use, coffee grains C and heated water are both added through top 45. The coffee grains C are typically first inserted through top diffuser 46 of top 45. The coffee grains sit within wire cloth filter 44 (around spherical diffuser 47). Then, heated water is poured through top diffuser 46 of top 45. The brewed coffee then seeps through wire cloth filter 44, and exits sleeve 42 through openings 43. In use, assembly 40 may be partially submerged in a fluid container, or be positioned within a flow path above a fluid container. An advantage of the system of Fig. 5 is that, after filtering is complete, a user simply turns the system upside down (pouring the coffee grains back out through the diffuser openings 46 in top 45). Diffuser openings 46 are dimensioned such that diffuser 47 remains within sleeve 42 when assembly 40 is upside down. Thus, ball-shaped diffuser 47 need not be attached to any part of assembly 40. An advantage of diffuser 47 is that when water is added from above, it will strike diffuser 47, splashing about causing rapid mixing, resulting in faster preparation times, and reducing the amount of coffee needed in the filter. For convenience, a carrying handle 49 is also provided.

**[0044]** Fig. 6 shows an embodiment of the invention involving a two part frame. Specifically, frame 52 includes an outer portion 52A and an inner portion 52B. Disposed therebetween is a wire cloth filter 54. Assembly 50 may be snap-fit together, screw-fit together or hinged together. Coffee grains C are placed into the center of assembly 50, and assembly 50 is closed therearound. Assembly 50 is then submerged in a fluid container. A convenient retrieval cord 51 is provided for removing assembly 50 from the fluid container after use. Each of frame portions 52A and 52B have openings 53 passing therethrough. As water passes through openings 53, brewed coffee will seep out of assembly 50 and into the fluid container.



**[0045]** Fig. 7 shows an embodiment of the invention incorporated into a drinking straw. Assembly 60 includes a drinking straw 61, an end of which is submerged below a water level W. Coffee grains C are placed within the fluid container holding the water. A frame 62 is provided at the bottom end of the drinking straw 61. Frame 62 has at least one opening 63. A wire cloth membrane 64 covers opening 63. In use, the drinker sips on the straw, sucking brewed coffee through wire cloth filter 64. An advantage of this design is that the coffee is actually brewed and filtered within the coffee drinker's cup itself.

**[0046]** Fig. 8 shows an embodiment of the invention incorporated into the lid of a drinking cup. Specifically, assembly 70 includes a coffee cup 71 having a lid 73. Lid 73 has an air inlet 75 passing therethrough, and a fluid outlet 77 passing therethrough. A wire cloth filter 74 covers a fluid outlet 77, as shown. In use, coffee grains C and heated water W are placed directly into cup 71. As the user drinks from cup 71 (i.e. sipping through fluid outlet 77) wire cloth filter 74 filters the coffee. Again, an advantage of this design is that the coffee is actually brewed and filtered within the coffee drinker's cup itself.

**[0047]** Fig. 9 shows an embodiment of the invention incorporating a floating member attached to the frame. Specifically, assembly 10 (Figs. 1 and 2) is suspended in a ring 80 of floating material. The system of Fig. 9 is simply placed into a fluid container with ring 80 preventing assembly 10 from sinking. Coffee grains C are placed into the top of assembly 10 (as was described above). Brewed coffee will seep out through wire cloth filter 14, passing through openings 13 in frame 12, as explained above. It is to be understood that the present floating member need not be ring-shaped. In addition, it is to be understood that the present floating member may be used to support any filtering assembly, and is not limited to only supporting assembly 10.

**[0048]** Fig. 10 illustrates a flow regulator 90 on the bottom of a frame (such as frame 12 as illustrated in Fig. 2). The flow regulator operates to selectively adjust the amount of flow through the bottom of the frame. It is to be understood that numerous

embodiments for such a flow regulator are possible, all keeping within the scope of the present invention. Flow regulator 90 includes a first portion 92 and a second portion 94 which rotate with respect to one another around a hub 95. Second portion 94 may simply comprise frame 12 having an opening 93 passing therethrough. First portion 92 may be hemispherical-shaped, and rotate such that when rotated in direction R, opening 93 will be progressively opened or closed. By adjusting the size of opening 93, the amount of flow passing therethrough can be adjusted. Optionally, opening 93 may be covered with a wire cloth filter, if desired.

**[0049]** Fig. 11 shows an embodiment of the invention in which assembly 100 includes a collar-shaped frame 112 having holes 113 passing therethrough. A wire cloth filter 114 is suspended within frame 112 and placed into a drinking cup 111. A lid 115 is snapped onto cup 111. In use, coffee grains C are placed into wire cloth filter 114. Heated water can be added directly into wire cloth filter 114, or cup 111, or both.

**[0050]** Lastly, Fig. 12 shows an embodiment of the invention in which assembly 120 includes a collar-shaped frame 122 in which wire cloth filter 124 is suspended. Frame 122 may have a plurality of holes passing therethrough, or only one hole in which wire cloth filter 124 is suspended. The coffee pot 121 in which frame 122 and wire cloth filter 124 are suspended may preferably include a lid 125 having a center funnel 126 through which heated water is passed during coffee brewing.